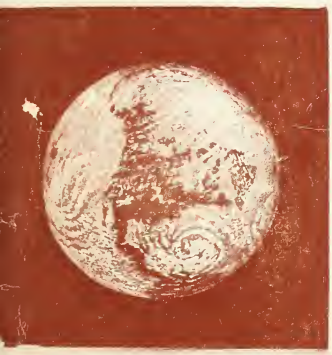
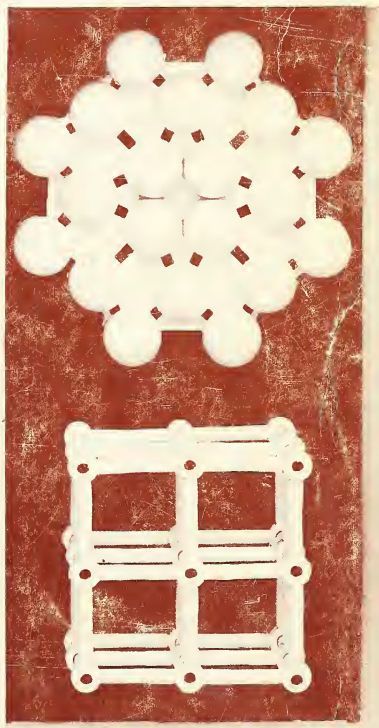
Activities for Exploring Science

RED BOOK





Activities for Exploring Science

RED BOOK

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CONTENTS

ACTIVITY 1 *(Textbook page 15)*

Which parts of the body are more sensitive to touch than others?

You will need: hairpin or paper clip bent into a U shape, pencil, paper, ruler, blindfold

- Have a partner put on the blindfold. Then have your partner hold out a hand, palm up.
- Spread apart the tips of the hairpin. Touch both tips lightly against the palm of your partner's hand. Be sure the tips touch at the same time.
- Ask your partner how many tips of the hairpin your partner feels. Sometimes touch your partner's palm with only one tip so that you know your partner is not just guessing.
- Squeeze the tips of the hairpin a little closer together. Touch your partner's palm again. Keep doing this until your partner can no longer tell whether you are touching the palm with one tip or two tips.
- Measure the distance between the two tips with the ruler. Write down this distance.
- Try other places on your partner's skin such as a fingertip, forearm, back of hand, forehead, back of neck, and lips. Keep squeezing the tips of the hairpin together until your partner cannot tell the difference between being touched with one tip and with two tips.
- Measure the distance between the two tips. Write down this distance.

1. Which place on your partner's skin was most sensitive to touch?

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2. Which place on your partner's skin was least sensitive to touch?

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3. *Why do you think some places are more sensitive than others?*

4. *Do you think some people are more sensitive to touch than others? How might you find out?*

ACTIVITY 2 *(Textbook page 19)*

How can you fool your sense of taste?

You will need: small pieces of onion, apple, and raw potato; blindfold

- Put on the blindfold, and hold your nose shut.
- Have a partner put some pieces of the onion, apple, and potato (one at a time) in your mouth.
- Tell your partner what you think you tasted. Have your partner keep a list of what you think you tasted and what you actually tasted.
- Try tasting five pieces of each food mentioned above.
- Write in the space below the number of pieces of food you guessed right.

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- Now take your fingers away from your nose. Try tasting five more pieces of each food.
- Write in the space below the number of pieces of food you guessed right.

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Do you think your sense of smell is important to your sense of taste? Why or why not?

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ACTIVITY 3 *(Textbook page 21)*

How well does your knee jerk work?

You will need: chair

- Sit down on a chair and cross your legs.
- Gently strike your leg just below your kneecap with your hand as shown. Keep doing this until you find the place that makes your knee jerk when it is struck.
- Repeat this, but try to keep your knee from jerking.

1. Do you think that the knee jerk is a simple reflex? Why or why not?

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- Cross your legs in the opposite direction, and strike your other leg. Observe the reaction of your leg. Compare this reaction with the reaction you got from the other leg.

2. What observation can you make about these reactions?

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- Observe the knee jerk of some other people.

3. What observation can you make about people's knee-jerk reactions?

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ACTIVITY 4 *(Textbook page 26)*

Which of your senses enables you to react the fastest—sight, hearing, or touch?

You will need: ruler, pencil, paper

- Ask someone to hold a ruler just above your forefinger and thumb. Be sure that the number 1 on the ruler is closest to the floor. Open your finger and thumb exactly as wide as the ruler's width.
- Then have your partner turn the ruler as shown.
- Have your partner let go of the ruler without warning. Try to catch the ruler with your finger and thumb as soon as you see the ruler drop.
- Write in the space below the number on the ruler at which you caught the ruler.

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- Do this 3 times. Then write down the average number in the space below.

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- Now try to catch the ruler again. But this time close your eyes and have your partner say "Now" at the exact time the ruler is released. Do this 3 times.
- Then write down the average number in the space below.

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- Now try again. This time close your eyes, and have your partner touch your head at the exact time the ruler is released. Write down your average number for 3 tries in the space below.

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1. Which of your senses enabled you to react the fastest?

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- Do the same experiment once again, but have your partner touch your foot exactly when the ruler is released.

2. Which area of touch—your head or your foot—enabled you to react faster? Why do you think there is a difference in reaction time?

ACTIVITY 5 *(Textbook page 34)*

How can you show that writing is a habit?

You will need: paper, pencil

- Give a partner a pencil and a piece of paper. Ask your partner to write down the following sentence in the space below as you read the sentence out loud. "At this time, that is interesting to think about."

- Now read the sentence to your partner again, but this time ask your partner to write the sentence in the space below without crossing the *t*'s and dotting the *i*'s.

- Trade places with your partner, and have your partner read the sentence for you while you write it in the space below.

- Now in the space below write the sentence without crossing the *t*'s and dotting the *i*'s.

Did you and your partner find it hard to write the sentence without crossing the t*'s and dotting the* i*'s? If so, why?*

ACTIVITY 6 *(Textbook page 36)*

How can you show that people learn some things by association?

You will need: paper and pencils for 2 or 3 people

- Give each of your partners a pencil and a sheet of paper. Tell your partners you want them to make a check mark on their paper each time you say the word "Check."
- Say the word "Check" about 15 times very quickly. About halfway through, start snapping your fingers at the same time you say "Check."
- After about 15 times, stop saying the word "Check" but continue snapping your fingers.

Did your partners continue to make check marks on their paper after you stopped saying "Check"? If so, why do you think they continued to do so?

ACTIVITY 7 *(Textbook page 59)*

What does the egg cell of a chicken look like?

You will need: chicken egg, pan or dish

- Crack open the shell of the chicken egg (a chicken egg is an egg cell) over the pan. Let the egg cell fall gently into the pan so that the egg cell does not lose its shape.
- Find the yolk, or the yellow part, of the egg cell. This part is food for the embryo. (A chicken egg from a store has probably not been fertilized, so you may not see an embryo.)

1. Why do you think this food is important?

- Find the clear part of the egg cell that surrounds the yolk. This part helps protect a growing chicken embryo.

2. How do you think the clear part helps protect the embryo?

- In some chicken egg cells, you might also find 1 or 2 white, cordlike parts. These parts connect the yolk to a thin lining inside the shell. The cordlike parts help keep the yolk in place. Try finding these cordlike parts.
- Also try to find the thin lining on the inside of the broken shell.

3. Why do you think the shell is important to a growing chicken embryo?

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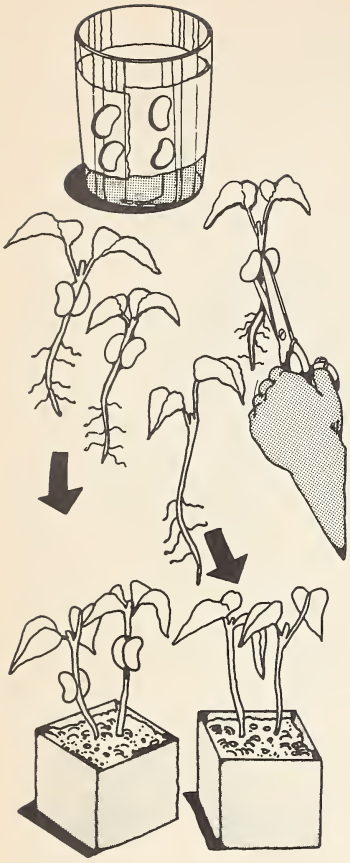
● In the space below, draw your chicken egg and label the parts of the egg you saw.



ACTIVITY 8 *(Textbook page 61)*

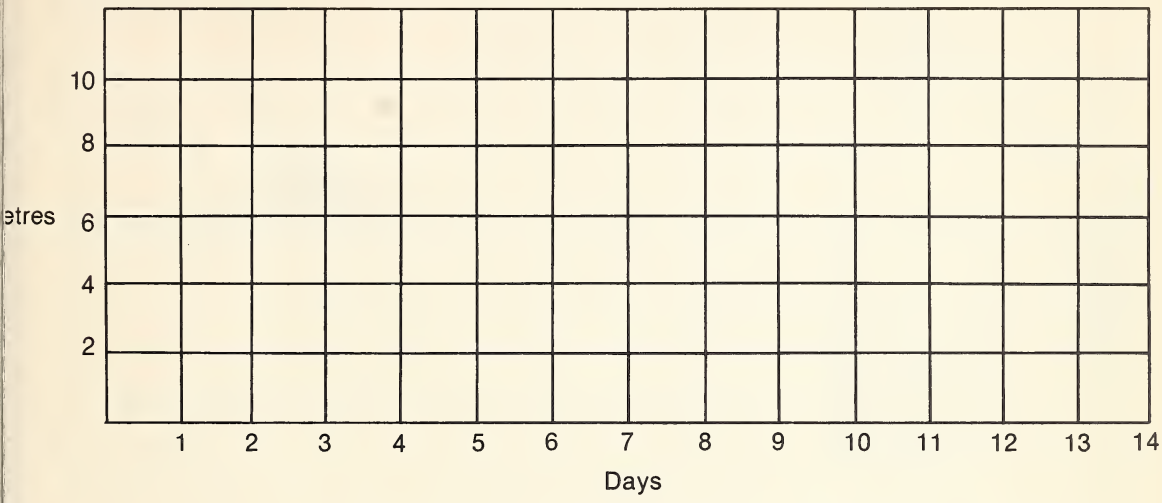
What happens to young plants when they do not get food from their seed?

You will need: about 4 or 6 seeds (such as lima beans or kidney beans), glass, paper towels, 2 milk cartons, soil, scissors

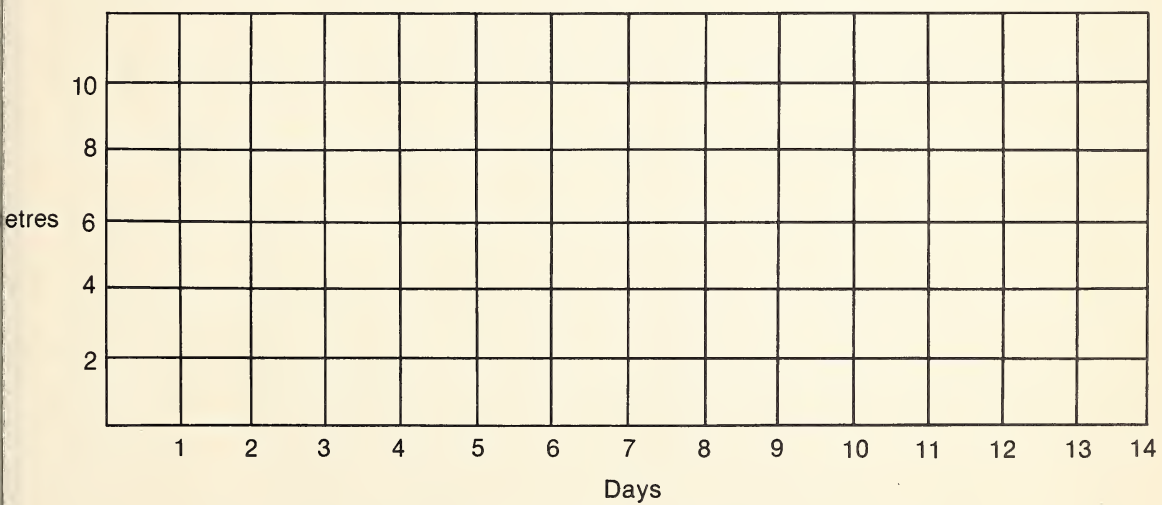
- Put the seeds (beans are seeds) in the glass to soak overnight.
- The next day, empty the glass. Put some paper towels, the seeds, and some water inside the glass as shown.
- Look at the glass every day to see that there is some water in it.
- When the seeds begin to grow, take the young plants out of the glass.
- Cut off the top of each carton. Fill the cartons with soil.
- Cut off the remaining parts of the seeds from the stem of half of the young plants as shown.
- Plant these plants in one carton. Plant the other young plants in the other carton.
- Place the cartons by a window through which sunlight often shines.
- Keep the soil damp for a week or two.
- Keep a record on the graph on the next page of the growth of your plants. Use a different coloured pencil for each plant.

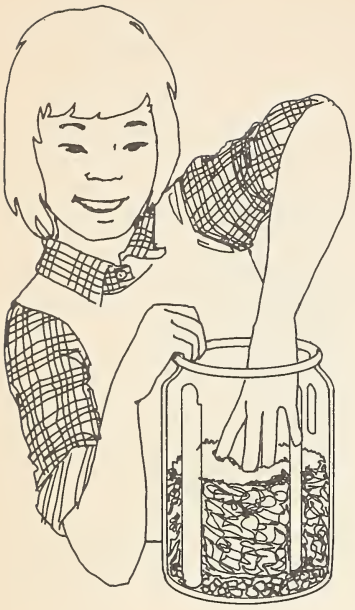
What happened to the young plants in each carton? Why?

Plants with Seed Parts



Plants without Seed Parts





ACTIVITY 9 *(Textbook page 66)*

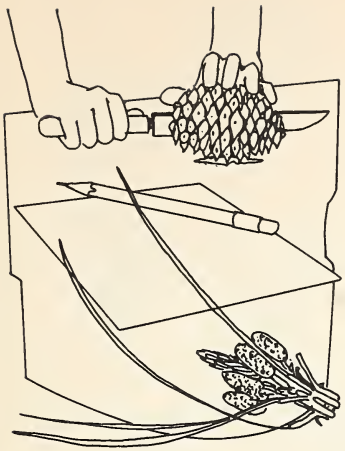
How can growing moss help you learn about the life cycle of a spore-bearing plant?

You will need: soil, small pieces of charcoal, widemouthed glass container, moss

Moss is a spore-bearing plant which has a life cycle similar to that of a fern.

- Line the bottom of the container with the charcoal.
- Fill the container about half full with soil. Carefully plant the moss in the soil.
- Place the container in a shady place.
- Keep the soil damp.
- Watch your moss grow for a few weeks.

What things did you learn about the life cycle of a moss?



ACTIVITY 10 *(Textbook page 69)*

What does the inside of some pinecones look like?

You will need: male and female pinecones which have not dried out, knife

- Draw a picture below of each cone.

- Using the knife, cut open each cone.
- Look at the inside of each cone. Draw below what you see.

1. How was the inside of each cone different?

2. Compare your cones with cones from other kinds of pines. How are the cones alike?

3. How are they different?

ACTIVITY 11 *(Textbook page 81)*

How can raising fish help you learn about their life cycle?

You will need: bucket, about 15 L glass container, clean aquarium gravel, 2 or 3 aquarium plants (from a pet store), 2 male guppies, 2 female guppies, fish food, small piece of cardboard

- Fill the bucket with water. Let the water stand for 2 or 3 days.
- Line the bottom of the container with about 3 cm of gravel.
- Cover the roots of the plants with gravel.
- Put the cardboard on the gravel as shown.
- Fill the container by slowly pouring water onto the cardboard. When finished, remove the cardboard.
- When the water is clear, put the guppies into the container.
- Feed the guppies a small amount of food every day.
- When you see newborn guppies in the container, put the adult guppies into another container.

1. How big were the new guppies soon after they were born?

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- Keep a record on the chart of how much the guppies grow.

Guppy Size After

1 Week	2 Weeks	3 Weeks	4 Weeks
5 Weeks	6 Weeks	7 Weeks	8 Weeks
9 Weeks	10 Weeks	11 Weeks	12 Weeks

- When the young guppies become adults and have new guppies, put the adults into another container so that they will not eat the new guppies.

2. About how much did the new guppies grow from the time they were born to the time they became adults?

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3. About how long did the young guppies take to become adults and have new guppies?

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4. What other things did you learn about the life cycle of a guppy?

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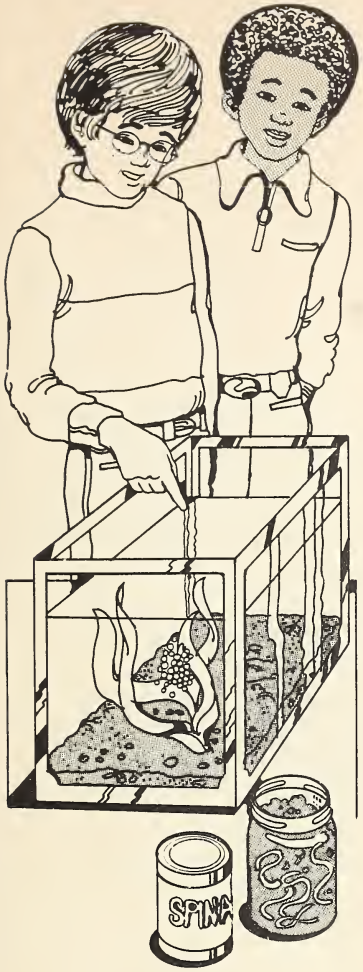

ACTIVITY 12 *(Textbook page 84)*

How can you hatch frog eggs?

You will need: bucket, large aquarium tank, glass top for the tank, aquarium gravel, aquarium plants, frog eggs (from a pond or a pet store), cooked spinach, tubifex (small worms from a pet store), earthworms

- Fill the bucket with water. Let the water stand in the bucket at least 2 days.
- Line the bottom of the tank with about 3 cm of gravel.
- Slowly fill the tank about three-fourths full with the water. Place the plants and the frog eggs in the tank.
- Watch the eggs every day. When the eggs hatch, put some spinach and tubifex into the water for the tadpoles to eat.
- When the tadpoles become young frogs, take some of the water out of the tank. Put gravel at one end of the tank so that the gravel is above the water level.
- Frogs need room to move. So you may want to keep one or two young frogs and let the others go free. Or put them into other tanks.
- Frogs usually eat only things that move. So to feed your frogs, you might put a worm on the end of a straw and wiggle the worm in front of them.
- Put the glass cover over the top of the tank. Do not handle the frogs any more than necessary.
- In the spaces below and on the next page, draw the various stages of the life cycle of a frog that you observe.

What things did you learn about the life cycle of a frog?

ACTIVITY 13 *(Textbook page 102)*

How can you show that an object has inertia?

You will need: small cart or toy car, paper, small object such as a piece of wood, rubber ball

- Place the small object on top of the cart.
- Quickly pull the cart toward you.

1. What happened to the object? Why?

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- Place the rubber ball on top of the piece of paper.
- Quickly jerk the paper away.

2. You should be able to jerk the paper away without making the ball roll. Why?

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- Place the object on the cart again.
- Begin moving the cart slowly, but then gain some speed.
- Quickly stop the cart.

3. What happened to the object? Why?

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ACTIVITY 14 *(Textbook page 105)*

How can you find the volume of some things around you?

You will need: pencil, paper, ruler

The volume of an object is found by multiplying its length times its width times its height. The box in the picture is 8 cm long, 5 cm wide, and 5 cm high. The volume of the box, then, is 200 cm^3.

- Find the volume of your science book.

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- Find the volume of your classroom.

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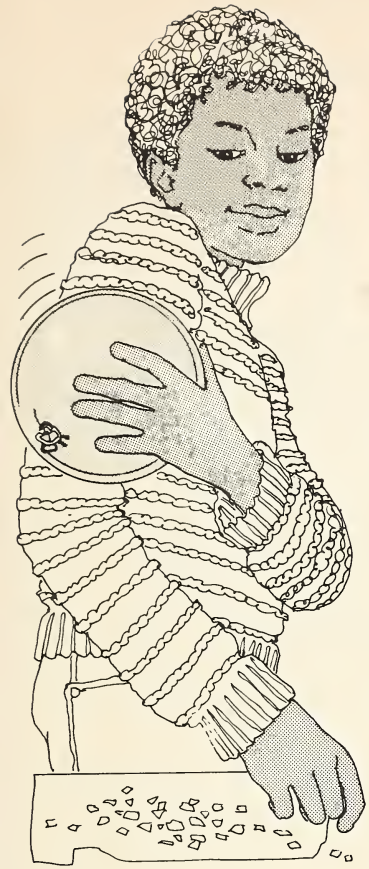
- Guess the volume of some other things around you. Then measure their volume.

How close were your guesses?

Object	Estimated Volume	Actual Volume



ACTIVITY 15 *(Textbook page 115)*

How can you "watch" how electrons make things act?

You will need: balloon, paper

When some kinds of matter are rubbed together, electrons are "rubbed off." The rubbing off of electrons makes these kinds of matter act in certain ways.

- Blow up the balloon, and tie a knot at the end.
- Tear the paper into tiny pieces.
- Rub the balloon on a shirt or other piece of cloth.
- Bring the balloon close to the pieces of paper.

1. What happens to the pieces of paper?

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- Rub the balloon on the cloth again.
- Place the balloon on the side of your desk or on a wall.

2. How does the balloon act?

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- Rub a few other things together.

3. How do some of these things act when electrons are rubbed off?

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ACTIVITY 16 *(Textbook page 126)*

How can you break water down into its elements?

You will need: 6-volt battery or 4 dry cells, glass jar, 2 test tubes (or toothbrush cases), 2 pieces of covered wire, 2 pieces of aluminum foil, 2 wooden splints, 7 mL sodium sulphate (from a drugstore), matches, tape

- Fill the glass jar two-thirds full of water.
- Add the sodium sulfate to the water.
- Fill each test tube with water and invert them in the jar as shown. (Be careful not to get any air in the test tubes.)
- Tape the test tubes in place.
- Attach each piece of aluminum foil to the ends of the wire.
- Place the aluminum foil in the test tubes as shown.
- Connect the other ends of the wires to the battery.

1. What happens on the aluminum foil?

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2. What changes do you see in the test tubes?

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- Allow the test tubes to fill up with gas.
- Test the gases with glowing splints as shown.

3. Which splint burst into flame? Why? (Textbook page 120 may help you.)

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4. Which splint caused an exploding pop? Why?

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ACTIVITY 17 *(Textbook page 128)*

How can you get rust to form on objects?

You will need: small pieces of iron (steel wool, bobby pins, hair clips, safety pins, nails, or old metal toys will do); paper towel; glass

- Soak the paper towel in water.
- Wrap some pieces of iron in the towel.
- Place the rest of the iron in a glass of water.
- Each day, check on the pieces of iron. Be sure to keep the towel wet.

1. What happens to each piece of iron?

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2. When do you first notice a change? What element in the water helps make the new compound?

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3. Why do you think rust is made on some things faster than on others?

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4. What might you do to prevent iron objects from rusting?

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ACTIVITY 18 *(Textbook page 139)*

How can you make a display of plastics?

You will need: old magazines, newspapers, scissors

- Search through the magazines and the newspapers for pictures of things made of plastic. Cut out each picture.
- Make a display of each picture on a bulletin board or in a scrapbook.

What are the uses of each plastic?

Plastic	Uses

What are the special properties of each plastic?

Plastic	Special Properties

Why do you think each of these things is made of plastic instead of another kind of material?

Instead of iron?

Instead of glass?

Instead of wood?

Instead of rubber?

Instead of cotton?

● Make a display of objects made of plastic.

What things in your school and your home are made of plastic?

Plastic	Where Found	Uses	Special Properties

ACTIVITY 19 *(Textbook page 148)*

How is chemical energy important in making bread?

You will need: 15 mL flour, 5 mL baking powder, large spoon with wooden handle, candle, small bowl

- Mix the flour and the baking powder in the bowl.
- Add enough water to make dough.
- Place the mixture in the spoon.
- Hold the spoon over a lighted candle. Heating the mixture will release chemical energy, causing bubbles of carbon dioxide to form.
- Watch your bread in the spoon.

What happens to the bread? Why?

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Here is a recipe for homemade bread. Try making some.

Dissolve 15 g fresh yeast in
450 mL 20°C water

In a separate bowl, sift together:
0.75 kg all-purpose flour
15 mL salt
Add: 15 g shortening

Stir the yeast mixture into the flour and mix to form a firm dough. Turn the dough out of the bowl and knead for about 10 minutes. Form into a ball.
Place the dough in a warm place (20°C) and allow the dough to rise for two hours or until doubled in size.
Knead the dough again and shape into a loaf. Place in a 1 kg loaf pan and leave to rise in a warmer place for about 30 minutes.
Preheat oven to 230°C. Bake 30 to 40 minutes. Cool on a wire rack.
Makes one 1 kg loaf.

ACTIVITY 20 *(Textbook page 153)*

How can you cause changes in energy?

You will need: candle, test tube, marble, clamp

- Half fill the test tube with water.
- Place the marble in the test tube.
- Using the clamp, hold the test tube over the flame as shown. Be sure the test tube is not pointing toward anyone.

1. What happens to the water inside the test tube? Why?

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2. What happens to the marble? Why?

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3. What kinds of energy were changed in this activity?

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4. Explain how energy changed from one kind to another.

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ACTIVITY 21 *(Textbook page 157)*

How can you feel heat waves?

You will need: several pieces of different-coloured construction paper

- Hold the palms of both hands very close to your face. Feel the heat given off by your hands.
- Have other people hold their palms close to your face.

1. Which palms gave off more heat waves than others? What things might cause some palms to give off more heat waves than other palms?

- Set up the pieces of coloured construction paper in a row. Be sure the same amount of light shines on each piece of paper.

2. Which colour do you think will give off the most heat waves? Why?

- With your eyes closed, have someone move your hand close to the different colours, one by one.

3. Did some colours give off more heat waves than others? Explain your results.

ACTIVITY 22 *(Textbook page 160)*

How can you make radio waves?

You will need: short piece of bell wire, portable radio, flashlight battery, tape

- Bare each end of the wire.
- Tape one end of the wire to the bottom of the battery as shown.
- Turn on the radio. Set the dial between stations so there is no sound. Be sure the volume is turned up.
- Hold the battery and wire close to the radio.
- Touch the free end of the wire to the battery's top knob. Quickly draw it away.

1. What do you hear?

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2. What do you see?

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- Continue brushing the wire's end on the battery knob.
- Have someone hold the radio and walk away to find out how far your "broadcast" can be sent.

3. How far away can you send your broadcast?

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4. In what ways might the way the radio is facing change the broadcast? Try finding out.

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ACTIVITY 23 *(Textbook page 168)*

How can you show how an electric generator works?

You will need: about 12 m of bell wire, thread, compass, strong magnet, paper cup

- Bare the ends of the bell wire.
- Wrap the bell wire about 50 times around the paper cup to make a coil.
- Slip off the coil, and fasten it with thread so the coils won't come apart.
- Wrap the rest of the wire about 20 times around the compass as shown. The compass will then act as an electric-current detector.
- Connect the bare ends of the bell wire. Your magnet and coil will work somewhat like an electric generator.
- Hold the magnet still, and move the coil over one end of the magnet.

1. What happens to the compass needle? Why?

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- Remove the coil by sliding it back.

2. What happens to the compass needle? Why?

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● Move the coil over the other pole of the magnet.

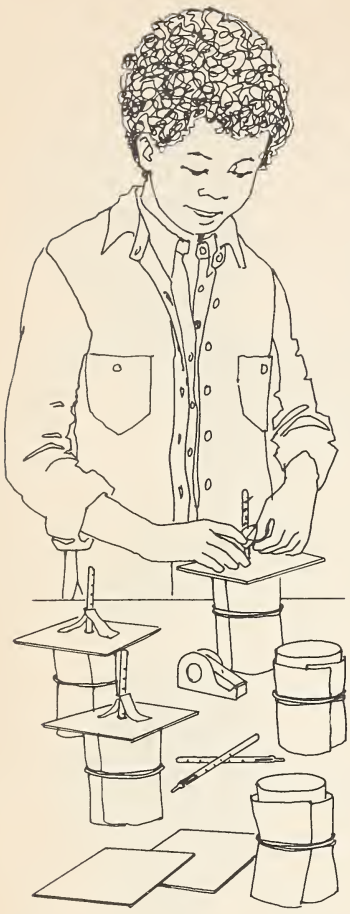
3. What happens to the compass needle? Why?

● Hold the coil still, and move the magnet in and out of the coil.

4. What happens to the compass needle? Why?

5. What do you think will happen if you move the magnet faster? Why? Try it.

6. What mechanical energy is used in this activity?



ACTIVITY 24 *(Textbook page 175)*

How does colour affect heat absorption?

You will need: 5 thermometers, 5 empty cans of the same size, gray paper, black paper, red paper, white paper, coloured paper of your choice, 5 rubber bands, cardboard for can covers, measuring cup, tape

- Wrap each can with different-coloured paper. Use the rubber bands to hold the paper in place.
- Using the measuring cup, pour an equal amount of cool water into each can.
- Tape the thermometers through the covers of each can as shown. Make sure the thermometers do not touch the sides or the bottoms of the cans.
- Record the temperature of each thermometer.
- Place each can in bright sunlight.

1. Which colour do you think will absorb the most sunlight? Why? The least? Why?

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- Take the temperature readings every 15 minutes for about 2 hours. Write down the temperatures.

2. In which can has the temperature changed the most? Why?

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3. In which can has the temperature changed the least? Why?

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4. How did the temperature in the can with the paper you chose compare with the other four?

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ACTIVITY 25 *(Textbook pag*

How can you compare the size o

rbiting

You will need: paper, pencil, scisso

To scale down the size of the planets, you measurement. The smallest unit can be the s .. you might use 1 cm as 1 unit.

- Mark off 1 unit on a piece of paper. This represents the diameter of Mercury. Make a circle from this diameter as shown.
- Use the chart below to measure the diameter of each planet.

Units for Diameters

Venus 2 1/2	Jupiter 29	Neptune 9
Earth 2 3/5	Saturn 25	Pluto 1
Mars 2 2/5	Uranus 10	Sun 287

- Cut out and label each planet.

1. Which planet is the largest?

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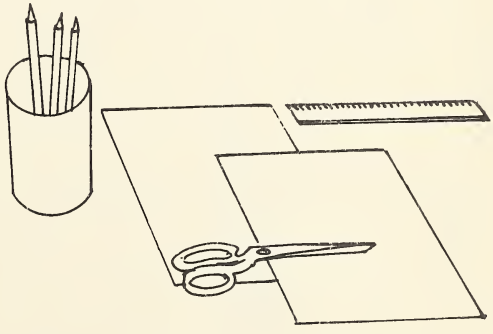

2. Which planet is the second largest?

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3. Which planets are about the same size as the earth?

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- Try comparing the size of the sun with the size of each of the planets.

ACTIVITY 26 *(Textbook page 200)*

How can you compare the planets' distance from the sun?

You will need: shelf paper (or other long paper), pencil, ruler

To scale down the distance of planets from the sun, you can use any unit of measurement. The smallest unit can be the distance of the closest planet to the sun. You might use 1 cm as 1 unit.

- At one end of your shelf paper, mark a spot as shown to represent the sun.
- Measure 1 unit from the sun. This represents the distance of the orbit of Mercury from the sun.
- Use the chart below to measure the distance of each planet from the sun.

Units for Distances from the Sun

Venus 1 4/5	Saturn 24
Earth 2 3/5	Uranus 46
Mars 4	Neptune 77
Jupiter 13	Pluto 102

1. Which planets are about the same distance apart in the solar system?

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.....

2. Which planets orbit near other planets?

.....

3. Which two neighbouring planets have the greatest distance between them?

.....

ACTIVITY 27 *(Textbook page 202)*

How can you show how the sun's gravity affects the orbiting speed of a planet?

You will need: small rubber ball, string

- Attach the string to the rubber ball. The ball represents a planet. The string represents the pull of gravity. (The shorter the string, the stronger the "gravity.")
- Hold the string about 30 cm from the "planet." Orbit the "planet" around you as shown.
- Now hold the string about 60 cm from the "planet." Orbit the "planet."

1. Which time did you have to move faster to keep your "planet" in orbit? Why?

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- Now hold the string about 90 cm from the "planet." Orbit the "planet."

2. How did this orbit compare to the other two? Why?

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3. What might happen if the orbiting "planet" were to lose its "gravity"? Why? Try finding out.

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ACTIVITY 28 *(Textbook page 211)*

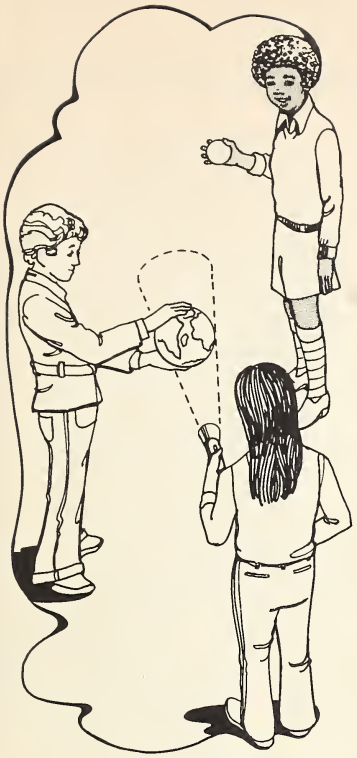
How can you show that a smooth surface reflects more light than a rough surface?

You will need: modeling clay, flashlight

- Divide the clay into 3 or more "asteroids."
- Make one "asteroid" very smooth. You might add water to help you do this.
- Make another "asteroid" uneven with your fingers or knuckles. Make still another "asteroid" very rough. You might use a pencil point for making deep holes.
- Shine the light on each "asteroid."

1. Which "asteroid" reflected the most light back to you? Why?

2. Would the size of the "asteroid" change the amount of light being reflected? If so, how?



ACTIVITY 29 *(Textbook page 222)*

How can you show the effect of eclipses?

You will need: flashlight, globe, model of the moon or small ball, darkened room

An eclipse of an orbiting object takes place when it is darkened by the shadow of another orbiting object.

- Shine the flashlight on the earth.
- Have someone rotate the earth on its axis.
- Have another person slowly orbit the moon around the earth. (The flashlight, the earth, and the moon should be held at the same height.)

1. What are the positions of the earth and the moon when there is an eclipse of the moon? Where can this eclipse be seen from the earth?

2. What are the positions of the earth and the moon when there is an eclipse of the sun? Where can this eclipse be seen from the earth?

3. Where must a person be standing in order to see an eclipse of the earth? Why?

ACTIVITY 30 *(Textbook page 233)*

How can you show how relay satellites bounce signals back to the earth?

You will need: small mirror, globe, small flashlight

- Darken the room and choose a spot on the globe from which to send the signal.
- Have someone hold the mirror away from the globe. This mirror represents the relay satellite in space.
- Turn on the light and aim it toward the "satellite."

1. Which spot on the globe received the signal? Why?

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- Choose other spots from which to send the signal.
- Move the relay "satellite" in orbit around the globe.

2. Can a signal bounced from the "satellite" be sent to any area on the globe? Why or why not?

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- Move the relay "satellite" farther from, then closer to, the globe.

3. How did the receiving spot change when the "satellite" moved farther from the globe?

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4. How did the receiving spot change when the "satellite" moved closer to the globe?

.....

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ACTIVITY 31 *(Textbook page 246)*

How can you make soil?

You will need: several small rocks of different kinds, coffee can with lid, water, small seeds (like mustard or radish seeds), can of garden soil

- Place the rocks in the can. Put about 3 cm of water in the can. Cover the can.
- Shake the can very hard about 100 times.
- Give the can to 5 friends and have them do the same thing.

1. What do you see forming at the bottom of the can?

2. How might this same thing happen in nature?

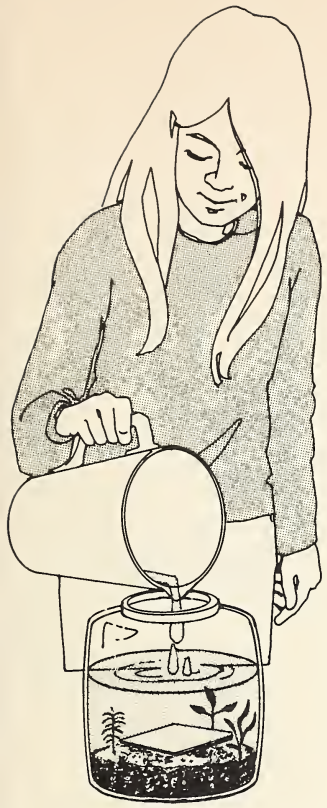
- Try rubbing some of the rocks together in your hands.
- Try breaking your rocks down in other ways.

3. Which of these ways is best for breaking the rocks down?

(Continued)

- Plant some of the seeds in the "soil" you made.
- Plant the other seeds in soil from a garden.
- Water the sprouting plants as needed for 2 or 3 weeks.

4. Which plants grew better? Why?



ACTIVITY 32 *(Textbook page 255)*

What is life in a freshwater ecosystem like?

You will need: widemouthed 4 L jar, water, sand, pond plants, guppies or goldfish, fish food, snails, cardboard

- Pour about 3 cm of sand in the jar. Put the plants firmly in the sand.
- Put the cardboard on top of the sand and slowly fill the jar with water. Remove the cardboard. Let the water stand for 24 hours. This allows chlorine gas in tap water to escape from the water.
- Put several guppies in the water. Add the snails.
- Put the freshwater ecosystem in a place that has light but not direct sunlight. Feed the fish every day.
- Observe your freshwater ecosystem for a week.

1. How do the living things in your freshwater ecosystem depend on the nonliving things?

2. *How do you think the living things depend on each other?*

3. *Describe and explain any changes that you see in your freshwater ecosystem.*

ACTIVITY 33 *(Textbook page 263)*

How might a city ecosystem begin?

You will need: sterilized soil (from a flower shop), large clay pot, small stones

This activity can be done anytime except winter.

- Put a layer of stones in the clay pot.
- Fill the pot with sterilized soil. By using sterilized soil, you make sure there are no growing plants present in the soil at the outset.
- Put the pot on the windowsill outside. Keep the soil moist. Wait a few weeks.

1. Have any plants grown in your pot? If so, where do you think the plants came from?

2. Which animals do you think will become a part of this city ecosystem? Watch and find out.

ACTIVITY 34 *(Textbook page 266)*

What living things can you find in a vacant lot or field ecosystem?

You will need: string, 4 twigs, ruler, bucket, paper towels, vacant lot or field

- Mark off a rectangle about 15 cm by 30 cm in the lot or field.
- Observe as many living things in your ecosystem as you can.
- Dig down about 10 cm and place the soil from your ecosystem in the bucket.
- Then carefully empty the soil, bit by bit, on the towels. Look carefully through all the soil.

1. What kinds of plants did you find in your ecosystem?

2. What kinds of animals did you find?

- Be sure to return the soil to the lot or field when you are finished.

3. Why do you think you should do this?

ACTIVITY 35 *(Textbook page 275)*

How does smoke affect plants and animals in an ecosystem?

You will need: several grasshoppers or other large insects, 2 small potted plants, 4 x 4 L jars with lids, 10 small pieces of incense, matches

- Place 2 insects in a jar and 2 in another jar.
- Place 1 plant in a jar and the other plant in another jar.
- Place 1 piece of incense in 1 insect jar and another piece of incense in 1 of the plant jars.
- Light the incense. Leave the other 2 jars clear.
- Keep all 4 jars capped. Keep the jars where they all get the same heat and light.
- Light the incense in the same jars once every day.
- Observe your plants and animals each day.

1. How does the smoke affect your insects?

2. How does the smoke affect your plants?

ACTIVITY 36 *(Textbook page 276)*

What happens when phosphate pollutants get into a freshwater ecosystem?

You will need: pond water with algae, phosphate fertilizer (from a flower shop), 2 glass jars, tablespoon

Sometimes phosphate fertilizers that run off the land can pollute a freshwater ecosystem.

- Put half the pond water in 1 jar. Put the other half in the other jar.
- Add 1 tablespoon of the phosphate fertilizer to 1 jar. Label this jar *A*. Label the other jar *B*.
- Put both jars in the light but not in direct sunlight. Wait for 2 or 3 weeks.

1. In which jar do algae from the pond seem to be growing more rapidly?

2. Why might too many algae in a freshwater ecosystem be a problem?

ANSWERS FOR ACTIVITIES
FOR EXPLORING SCIENCE RED BOOK

When your pupils carry out an activity, the results they observe may often vary. Therefore, there are really no right or wrong answers for the activities. The answers given in this answer key should be viewed as sample answers that you might expect from your pupils. It is up to your discretion to determine the acceptability of your pupils' answers.

Activity 1 pages 2-3

1. My partner's fingertip was most sensitive to touch.
2. The back of my partner's neck was least sensitive to touch.
3. Because some parts of a person's body have more sensory neurons sensitive to touch than other parts of a person's body.
4. I don't know. I could pick three or four people and measure the sensitivity of the same two or three parts of each person's body. Then I could compare the measurements I got for each person to see if one person is more sensitive to touch than the others are.

Activity 2 page 4

Yes. Because I was able to identify more pieces of food when I did not hold my nose shut than when I did hold my nose shut.

Activity 3 page 5

1. Yes. Because I cannot keep my knee from jerking when I strike my leg in the right place.
2. The answers may vary from "both legs reacting about the same" to "one leg reacting to either a much lesser or much greater degree."
3. Almost everyone has a visible knee-jerk reaction, but some people's reactions are much stronger than others.

Activity 4 pages 6-7

1. My sense of sight.
2. I reacted faster when my head was touched than when my foot was touched. There was this difference in reaction time because the farther an impulse must travel, the slower the reaction time becomes.

Activity 5 page 8

Yes. Because writing is a habit.

Activity 6 page 9

Yes. Because my partners learned to associate the snapping of my fingers with making check marks on their paper.

Activity 7 pages 10-11

1. Because it is needed by the embryo for growth.
2. It acts as a cushion, which helps keep things from injuring the embryo.
3. Because it is hard, it helps keep things from injuring the embryo.

Activity 8 pages 12-13

The plants with the remaining parts of their seeds grew better than the other plants. Because the remaining parts of the seeds give growing plants food. The plants without those parts did not get enough of the food they needed in order to grow well.

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Activity 9 page 14

Male and female parts of an adult moss grow out of its leafy shoot. After a sperm cell fertilizes an egg cell, a new plant grows up from the adult plant. This plant has a stalk with a capsule on top. This capsule has spores inside. When the spores are ripe, they fall to the ground and grow into adult mosses.

Activity 10 pages 15-16

1. The scales of the male cone are small and have pollen sacs attached to their underside. The scales of the female cone are larger, woody, and have seedlike parts that hold egg cells.
2. Each has scales attached to a main part, much like leaves are attached to a stem. The male cones have pollen sacs. The female cones have seedlike parts with egg cells.
3. They are different in size and in colour. Their scales have different shapes.

Activity 11 pages 17-18

1. Just big enough to see.
2. About two centimetres.
3. About three months.
4. The guppies were born live rather than hatched from eggs.

Activity 12 pages 19-20

A newly hatched tadpole is very small and not fully developed. It attaches itself to plants or to the egg mass until its tail is longer and stronger. Later, hind legs develop, then front legs develop, then the tadpole's tail begins to shrink. Its mouth becomes broader and teeth develop. After its lungs develop, the tadpole climbs out of the water.

Activity 13 page 21

1. It did not move along with the cart because a force was applied to the cart but not to the object.
2. Because no force was applied to the ball to make it move.
3. The object continued to move. No stopping force was applied to the object, so it kept moving.

Activity 14 page 22

Volume of science book: 942 cm^3.

Activity 15 page 23

1. They stick to the balloon.
2. The balloon sticks to the wall.
3. When one object is rubbed, the electro are "rubbed off," and that object will be attracted to many other objects.

Activity 16 page 24

1. Gas bubbles appear on the aluminum foi
2. Gas bubbles rise into the test tube.
3. The splint in oxygen. Oxygen is neede for fire.
4. The splint in hydrogen. Hydrogen is an explosive gas.

Activity 17 page 25

1. Some pieces of iron will show more rus on them than others.
2. After about twenty minutes. Oxygen.
3. Some objects have protective coatings. Objects with no protection will rust quickly.
4. Some objects can be painted or given other protective coverings.

Activity 18 pages 26-27

The use of each plastic will vary. Possibilities include transportation, communication, protection, and art. Special properties will include colour, brittleness, elasticity,and nonconductivity. In most cases, plastic is used because it is less expensive to make than other substances. Objects made of plastic used in a school are rulers, pens, desks, and book covers. Objects made of plastic used in a home are curtains, carpeting, and parts of TVs, radios, toasters, and furniture.

Activity 19 page 28

Carbon dioxide bubbles form in the dough. These bubbles become larger, which causes the bread to rise in the spoon.

Activity 20 page 29

1. The water begins to boil. The flame causes heat energy to warm the test tube to the boiling point of water.
2. The marble moves up and down and rattles against the test tube.
3. Chemical, heat, mechanical, and sound.
4. The chemical energy of the candle changed to heat energy. The heat energy caused the water to boil, which supplied mechanical energy to move the marble. When the marble rattled against the test tube, mechanical energy was changed to sound energy.

Activity 21 page 30

1. Some body temperatures are normally higher than others. Some people may have a fever. Others may be overheated from activity.
2. The red construction paper may give off more heat waves because the energy waves of that colour are closest to heat waves.
3. Answers will vary.

Activity 22 page 31

1. Crackling, static noise.
2. Small sparks shooting away from the wire.
3. Answers will vary.
4. Answers will vary.

Activity 23 pages 32-33

1. The needle will move from its original position. This happens because an electric current is passing through the coil of wire.
2. The needle will return to its position because there is no electric current passing through the wire.
3. The needle will move because an electric current is passing through the wire.
4. The needle will move because an electric current is passing through the wire.
5. When the magnet is moved faster, more electricity will be generated. This is shown by more movement in the compass needle.
6. The movement of the magnet in and out of the coil.

Activity 24 page 34

1. The black will absorb the most sunlight because it is the darkest. The white will absorb the least sunlight because it is the lightest.
2. The black because it absorbed the most sunlight and thus the most heat.
3. The white because it absorbed the least sunlight and thus the least heat.
4. Answers will vary.

Activity 25 page 35

1. Jupiter.
2. Saturn.
3. Venus, Mars.

Activity 26 page 36

1. Venus, Earth, Mars.
2. Mercury, Venus, Earth, Mars.
3. Uranus, Neptune.

Activity 27 page 37

1. When I was spinning the short string because the pull of "gravity" was greater.
2. It is much slower because the pull of "gravity" is less than the other two.
3. It would go off into space in a straight line because there is no more pull of "gravity."

Activity 28 page 38

1. The smooth "asteroid" did because there are no markings to cause shadows and absorption of light.
2. Yes and no. A small, smooth asteroid may reflect more light than a large, rough one.

Activity 29 page 39

1. If the earth is between the sun and the moon, there is an eclipse of the moon. This can be seen from the side of the earth which faces the moon.
2. If the moon is between the sun and the earth, there is an eclipse of the sun. This can be seen from the side of the earth that is facing both the moon and the sun.
3. Out in space. If the earth is between the sun and the moon and a person is standing in a straight line on the other side of the moon, that person would see an eclipse of the earth.

Activity 30 page 40

1. Answers will vary depending upon the angle of the mirror.
2. No. A signal can be sent only halfway around the earth. If the satellite and the signal move, a signal can be sent anywhere on the earth.
3. The receiving spot became larger.
4. The receiving spot became smaller.

Activity 31 pages 41-42

1. A thin layer of dirt or soil.
2. It might happen in a heavy rainstorm, when rain dashes smaller rocks against other rocks, causing soil to be formed.
3. Answers will vary.
4. The plants grown in soil from a garden grew better, because the soil had the minerals plants need.

Activity 32 pages 43-44

1. The living things need water and air dissolved in water. They also need light. Plants need light in order to make food, and fish need light in order to orient themselves in water. Plants need minera from the sand.
2. Plants give off oxygen when they make food. Oxygen is used by bot' plants and animals for breathing. Both plants and animals give off carbon dioxide when the breathe. Plants use carbon dioxide in making food. The snails and fish eat plants. The snails also clean up the waste matter in the jar.
3. Answers will vary.

Activity 33 page 45

1. Yes. They must have come from seeds or spores carried by the wind.
2. Maybe some ants and other insects wil crawl into the pot.

Activity 34 page 46

1. Answers may vary.
2. Answers may vary.
3. Because soil is valuable in an ecosys and cannot be replaced easily.

Activity 35 page 47

1. The insects tried to escape at first, time the incense was lit. Later, after each burning, the insects seemed to be sleepy or sick.
2. The plants in the jar with the burnin incense seemed to get less healthy each day.

Activity 36 page 48

1. In the jar with the phosphate fertili
2. Because there might not be enough spa for all the algae. Also, too many algae would produce an oversupply of carbon dioxide, which can be harmful to the ecosystem.

Name_____

The Exploring Science Program